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ABSTRACT

The ability to conduct field-based research is a particularly valuable tool for special education teachers working in isolated rural areas. To address this need, the University of Kentucky's Developmental and Behavioral Disorders Program focuses on preparing graduate-level special education personnel to work in diverse settings; provide consultation, inservice training, and information dissemination; and analyze and conduct applied research. In addition to this on-campus program, distance learning coursework is offered through the Training Rural Educators in Kentucky (TREK) projects. All students must complete three courses that teach research and related skills: an advanced course in applied behavioral analysis; a course focusing on instructional methodology; and a course in single-subject research design. Rural research is facilitated through a graduate course that focuses on instructional issues and methodologies: group instruction, instructive feedback, embedded skill instruction, and observational learning. These skills are utilized and implemented by students in their own classroom setting. The thesis requirement of a classroom research project trains rural educators who are geographically and professionally isolated to independently solve classroom problems. Teachers acquire the skills needed to objectively analyze the classroom environment and student behaviors, generate hypotheses, implement and modify behavioral and instructional programming, and use research results to defend or discard classroom practices. Two examples include a teacher research project and a collaborative study conducted by a program graduate and a faculty member. Practical applications and issues in rural research are summarized. (SAS)

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Special educators often may find themselves isolated within the school setting, particularly if they work in the area of low incidence disabilities. This problem may be exacerbated for a teacher in a rural region who may be the lone person, or one of few persons, in the entire district who is trained in the low incidence area (Helge, 1981). Since its inception in 1984, the Developmental and Behavioral Disorders (DBD) program at the University of Kentucky (Schuster, Collins, Nelson, Gast, & Wolery, 1991), a graduate program that focuses on Moderate/Severe Disabilities (MSD) and Early Childhood Special Education (ECSE) has trained over 100 teachers. Since the vast majority of these teachers have returned to rural regions, the program has developed three major objectives to enable graduates to best meet the needs of the school districts in which they work. These include preparing graduate level personnel to (a) work in diverse settings with persons who exhibit developmental and behavioral disorders, (b) provide consultation, inservice training, and information dissemination related to serving persons with developmental and behavioral disorders, and (c) analyze and conduct applied research with persons who exhibit developmental and behavioral disorders.

In addition to the on-campus program, the Department of Special Education and Rehabilitation Counseling (EDSRC) has extended the outreach of the DBD program by offering distance learning classes through the Training Rural Educators in Kentucky (TREK) projects (Collins, in press; Collins, Hemmeter, Schuster, & Stevens, 1996; Schuster et al., 1991). The TREK programs have enabled rural special education teachers and related service delivery personnel (e.g., speech/language pathologists) to come together in small groups in rural communities to complete degree, certification, and/or teaching advancement coursework through distance learning technology (i.e., satellite, compressed video).

Whether students are enrolled in an on-campus or off-campus master's program, they complete a minimum of 36 hours of graduate coursework that includes a minimum of 9 hours of practica, 3 hours of thesis research, and 6 hours of elective coursework (selected from courses offered outside of the EDSRC). Regardless of whether a student is completing a master's degree, an advancement in teaching rank, and/or certification, all students must complete a series of courses that are driven by a philosophy in applied behavior analysis.

Specifically, the DBD program has developed a series of three courses that teach research and related skills to teachers. First, students must complete an advanced course in applied behavior analysis (ABA) in which students learn basic principles and theory of ABA and specific applications to social behavior. (An introductory course in ABA is offered which covers basic principles and theory for both social and academic behavior; however, the course is not required at the graduate level). This course uses a textbook, approximately 40 research-based journal articles, and other media (e.g., film). It also involves an Internet component to address social behavior issues. Students must write a behavior reduction program (within the paradigm of an experimental design) and abstract related research articles from the professional literature. Research skills targeted in this course for students to acquire include selecting and measuring dependent variables, identifying and developing independent variables, selecting and identifying some basic experimental designs, and measuring dependent variable reliability data.

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Second, students must complete a course in ABA which focuses on instructional methodology. In this course, a textbook and over 60 data-based research articles, as well as other teaching tools, provide the framework for students to write and implement a data-based classroom project which increases targeted academic behaviors. Additionally, students must develop and write instructional plans. Students must use one of the many instructional strategies learned in the course for the implementation of the academic change project and must write instructional plans which cover four other instructional strategies. Some of the research skills addressed in this class include operationalizing various response prompting strategies as independent variables, learning additional experimental designs, and measuring independent variable reliability data.

Finally, students must complete an ABA course in single subject research designs. During this course, students use research-based articles (no textbook is required) to learn about the 14 single subject research designs and other research-related skills (e.g., how to review manuscripts for a professional journal). In addition, students may use The Single Subject Research Advisor (SSRA) (Blackhurst, Schuster, Ault, & Doyle, 1996) as a learning tool. The SSRA is a computer expert system which addresses all single subject research designs and delineates how to collect data on dependent measures. Additionally, the SSRA contains a data base of over 500 studies that have used single subject research designs. As a requirement of this class, students must develop and write a research proposal that uses a single subject research design. The proposal must include a review of the literature, specific research questions, a rationale for the proposed study, a completed methods section, and a section which outlines how the results will be analyzed. Many students use this proposal as a basis for their subsequent theses.

As a result of this series of courses and the subsequent thesis completion, the DBD program has a history of student research conducted in the rural classroom that meets the stringent guidelines for publication in the professional literature. (A list is available from the authors on request.) DBD students have published studies that they conducted as class projects during coursework, as independent studies to meet the thesis requirement, and as personal teaching projects following degree completion. As a result of their research, teachers provide their students with state of the art programming while answering questions about how best to deliver instruction and change behavior. Some of the questions investigated by rural teachers have involved finding ways to facilitate generalization when community-based instructional opportunities are limited, how to select instructional materials that reflect a rural setting, and how to facilitate interactions between students with and without disabilities when rural attitudes are a barrier.

The purpose of this paper is to describe (a) a research-based DBD course in special education instructional methods that is delivered to rural teachers both on-campus and through distance learning technology, (b) how the thesis requirement has been used to document effective practices in rural settings, and (c) the ongoing research relationship that EDSRC faculty have developed with graduates of the program who are employed in rural settings. In addition, the paper briefly will discuss issues relating to conducting research in rural areas.

Facilitating Rural Research Through Graduate Coursework

Students in the TREK-DL project work toward one of two Masters degrees in either ECSE or MSD. Regardless of the major area of study, all students are required to take Methods for Teaching Students with Disabilities. This course is an advanced ABA course that focuses on instructional issues and methodologies for learners with a variety of disabilities. The course is designed to teach students various instructional procedures (e.g., constant time delay, system of least prompts, simultaneous prompting) that have proven effective for teaching learners with disabilities. In addition, students learn about other aspects of instruction including group instruction, instructive feedback, embedded skill instruction, and observational learning. The approach for teaching these procedures and related concepts involves textbook readings (Wolery, Ault, & Doyle, 1992), research articles, lecture, and role play in the classroom. A cumulative

project that assesses the students' knowledge and skills related to instructional program planning is required of all students.

The instructional program is designed to provide students with an opportunity to utilize the skills learned in the course in their own classroom and to begin thinking about potential thesis topics (i.e., use of a particular procedure). An initial requirement of the assignment is that students meet with the professor to discuss what they want to teach and with what procedure. Students may elect to teach any skill that is functional for the age and ability levels of their students. Likewise, they may use any of the instructional procedures they learned in class to teach the skills. Students must select a research design and follow the requirements for its use (e.g., if they use a multiple probe design, they must collect periodic probe data). After the initial conference, students begin collecting data for their project. Once baseline data are collected, the students conference once again with the instructor. In the case of students who live in rural areas, the instructor requests a graph of the data via fax or mail and then conferences with the student on the telephone to assure that stable baseline data have been achieved. Students then implement intervention. A third conference is held with each student when their target student(s) reach criterion on the target skills. Once again, the instructor requests graphed data to assist students in interpreting and analyzing the results. After instruction is completed, students must write a paper describing their project and submit if for a grade. The areas that must be covered in the project write-up include (a) student description, (b) instructional objectives, (c) rationale, (d) prerequisite skills, (e) precautions for implementation, (f) instructional setting, (g) general procedures, (h) materials and equipment, (i) data collection procedures, (j) data recording sheets, (k) screening procedures, (l) baseline procedures, (m) instructional procedures, (n) maintenance and generalization procedures, (o) reliability, (p) experimental design, and (q) data summary.

The benefit of this project on student learning is immeasurable. It is not uncommon to hear students say that they realize they "were not really teaching" until they implemented their instructional program. One such student, Lana Mullins, is a teacher in a rural school district in eastern Kentucky who teaches students with a range of abilities, including those with learning disabilities as well as mild mental disabilities. She was concerned about the range of abilities in her classroom and how she could meet the needs of all of the students. As a result, she decided to develop her project around teaching a group of learners, each of whom was learning a different skill. She selected the antecedent prompt and test procedure to teach three students. One student was taught survival signs, a second Dolch words, and a third multiplication facts. In addition, Lana collected data on the degree with which students learned each other's targeted information by observing the instruction of others in the group. A multiple probe across skills design replicated across three students with mild mental disabilities showed that the target students met criterion on the target tasks. As well, all students learned non-targeted information that was not taught directly to them. Although there were some design flaws with her study, instructor feedback will assist her in developing her thesis. The teacher was ecstatic with the results of the program. She reported benefits beyond skill acquisition that included (a) students' enthusiasm about learning in this manner, (b) valuable use of teacher time, (c) reduction in her anxiety about completing a thesis, and (d) other teachers in the school interested in learning about the procedures.

Facilitating Rural Research Through a Thesis Requirement

The conceptual framework behind the thesis requirement rests on the belief that teachers, who may find themselves geographically and emotionally isolated and lacking access to resources (e.g., university professors, special education libraries, trained consultants), should have the research skills to independently problem solve in their classrooms. In other words, teachers need the skills to (a) objectively analyze the classroom environment and the behaviors of the target student, (b) generate hypotheses for increasing or decreasing target behaviors based on a professional research base, (c) systematically and consistently implement behavioral and

instructional programming, (d) make modifications in programming based on student data, and (e) defend or discard classroom practices based on the results of student data.

Based on the required coursework leading up to the thesis requirement, students rarely encounter methodological problems when completing their thesis. This is evident by the fact that over 80% of all DBD student theses are accepted for publication in refereed journals. However, logistical problems are often evident when trying to teach and/or conduct research in rural areas. When trying to provide state-of-the-art teaching in rural areas, many specific logistical concerns arise. Some of these logistical problems include (a) the high costs of providing transportation from isolated areas where schools are located to appropriate community-based instructional sites, and (b) the necessity (due to transportation costs and distance), but difficulty, in providing effective simulated instruction for natural community settings.

One DBD-TREK student, Rachel Branham, who worked in a rural, isolated setting was confronted with these same problems when teaching her secondary students with moderate mental retardation. Her students needed to acquire functional, community-based skills such as street crossing, cashing a check, and mailing a letter. However, logistical transportation problems prevented her from accessing the community on a frequent basis to ensure that general case programming could be used to encourage generalization to the distant and multiple sites encountered by her students within their home communities. Therefore, based on (a) her experiences in this rural area, (b) the research literature on in-vivo and simulated instruction and its effects on generalization, and (c) the potential effectiveness for video instruction, Rachel proposed a study for her thesis which would not only provide information for her specific setting but also would add to the research literature.

Rachel proposed a study which compared three instructional packages. These packages included (a) classroom simulation with community-based instruction, (b) videotape modeling with community-based instruction, and (c) classroom simulation with videotape modeling and community-based instruction. She used these three formats to teach secondary-aged students with moderate mental disabilities to cross the street, cash a check, and mail a letter. The three strategies were counterbalanced across students and tasks. She used a constant time delay procedure to teach all three skills within a multiple probe across skills design which was replicated across the three students. Rachel also assessed generalization to novel community settings.

Classroom simulation occurred within her own high school classroom and the hallway outside of her classroom. Peer tutors served in the role of the bank teller and acted as cars when crossing the street was taught. Videotape modeling included a videotape of a peer completing the task analysis for each targeted skill. Community-based instruction occurred in the community site closest to the school where students would mail letters and cash checks for members of the school staff. The effectiveness data indicated that all students learned each skill regardless of which instructional format was used for delivery. In addition, all students generalized the skills to novel community settings regardless of the instructional format. However, efficiency data indicated the combination of classroom simulation and community-based instruction was the most efficient strategy across all participants in terms of instructional time to criterion. The strength of this particular study is that it shows that instruction can result in generalization even when community-based instruction cannot be conducted on a daily basis and that videotape modeling can be as effective an adjunct to community-based instruction as classroom simulation. The strength of this study as a thesis is that it allows a student to acquire and use research skills while answering questions specific to a particular student and site while contributing to the research literature (Branham, Collins, Schuster, & Kleinert, in press).

Facilitating Rural Research Through Post-Graduation Relationships

Special education teachers who have completed a stringent personnel preparation program temporarily may find that they are relieved to be finished with degree requirements and anxious to focus on instruction in their classrooms. However, those who have been trained in a program with a strong behavioral approach that emphasized data-based instruction will soon find that the line between instruction and research can be so fine as to be non-existent. A strong foundation in ABA requires that a teacher continue to analyze the behaviors of all students, search for the best means of increasing desired behaviors, and make data-based program decisions and modifications that will be beneficial to the students. In addition, the federal law requires that special education teachers develop individual student goals and objectives and document progress in meeting them. This need for the continued use of research skills is conducive to developing a continuing research relationship between faculty and graduates who find employment in special education classrooms. In particular, the continued research relationship is advantageous to rural teachers who may find themselves isolated from those who are supportive of their efforts to problem solve and try novel practices within their classrooms.

Hemmeter, Doyle, Collins, and Ault (1996) have developed a checklist for conducting field-based research based on their experience working with special education teachers in the field. The checklist contains 31 steps to complete when conducting field-based research. Steps in getting started include (a) identifying the research question, (b) selecting the research design, (c) defining the roles of the participants, (d) obtaining permissions, (e) selecting target students, (f) developing and obtaining materials, and (g) setting a starting date. Steps in implementation include (a) scheduling reliability observations, (b) updating materials, (c) summarizing data, and (d) providing feedback to participants. Steps in completing the research project include (a) providing a final data summary and (b) conducting a follow-up with parents and the administration. Those who are considering conducting field-based research may wish to refer to these guidelines and the suggestions for implementing each step.

An EDSRC faculty member implemented the steps suggested by Hemmeter et al. (1996) in conducting a research study with, Meada Hall, a graduate of the DBD program was employed in a rural setting (Collins, Hall, & Branson, 1997). In this study, the roles of those involved in the collaborative research relationship were defined in the following manner. First, the EDSRC faculty member designed the study in collaboration with Meada and an English teacher in the same school. Each member of the group benefited from the study in that the faculty member was able to answer a research question in special education instructional design, the special education teacher was able to design and document instruction in recreational skills for her class of students with functional mental disabilities, and the English teacher was able to provide the students in her advanced composition class with a hands-on inclusive experience that served as the basis for assigned written pieces. Second, each member of the team performed specific tasks during the study. The special education teacher identified appropriate recreational skills for instruction, conducted daily instructional sessions, and recorded and graphed student data; the faculty member collected reliability data, suggested modifications, and wrote about the project for publication; and the English teacher provided peers from her class for weekly generalization sessions, collected data on the validity of the recreational skills targeted for instruction, and collected written data that documented changes in attitudes in the students without disabilities toward the students with disabilities.

Specifically, the Collins et al. (1997) study questioned the effectiveness of a system of least (SLP) prompts procedure to teach recreational skills to students with functional mental disabilities (FMD) who attended a rural secondary school. The target skills (i.e., playing a computer game, selecting and watching a television program, watching a sports videotape, and playing a card game) were derived from a local survey and reflected those in which student peers without disabilities in the rural community most often participated. The special education teacher selected

the SLP procedure based on previous classroom data that showed the procedure to be effective in teaching chained tasks. On Friday of each week, peers without disabilities from the advanced composition class participated in the target skills with the students with disabilities. A multiple probe across skills design replicated across four students with FMD showed that the target students met criterion on the target tasks and showed an increase in the generalized ability to perform those skills with peers without disabilities. The peers without disabilities wrote pre- and post-intervention reactions regarding their attitudes toward the students in the FMD class. An analysis of those reaction papers showed that attitudes changed from being largely ambivalent (e.g., don't know or care about the students with disabilities) to positive (e.g., students with disabilities thought of as friends and having value as a fellow human being). In summary, the project was considered a success. The special education teacher came into the study with the skills to successfully conduct a research project, having previously completed our graduate program and a thesis that resulted in publication (Hall, Schuster, Wolery, Gast, & Doyle, 1992). The continued research relationship with the faculty member gave the special education teacher the support to try something novel (e.g., collaborating with the English teacher) and to gain recognition in her rural school district through a resulting professional publication and presentations (i.e., university symposium, state conference).

Summary of Practical Applications and Issues Involved in Rural Research

The ability to conduct field-based research appears to be a valuable tool for special education teachers. This may be particularly true for rural teachers who may find that they are isolated from universities or consultants who could keep them abreast of current best practices. However, based on our experience, several issues should be considered in conducting research within a rural area.

The rural researcher needs to be flexible in designing a research project, taking geographic challenges into consideration. First, the geography may drive the research question (e.g., how to conduct effective simulations when frequent CBI is not possible). Second, subject selection can involve heterogeneous groups of students when a homogenous subject pool is small. For example, the subjects can include students with mild to severe disabilities instead of a group of students with severe disabilities only. Third, there may be a limited number of training settings for a study that involves generalization. In addition, transportation may further limit access to those settings. Fourth, instruction may be compromised by a greater likelihood of student absence due to such variables as schools being closed for extended periods due to inclimate weather and district-wide illness. Also, instruction may impeded by nonsupportive school personnel who do not value field-based research. Fifth, rural researchers may have difficulty finding reliability data collectors who are familiar with the instructional procedures and the data collection system used by the field-based researcher. For example, extra time may have to be set aside to train classroom assistants to collect reliability data prior to beginning the study. Sixth, geography also may affect the design of a research project. For example, a project may need to use a multiple probe design in place of a multiple baseline design when it is impossible to collect continuous baseline data in a setting or with a student. Finally, it may be difficult for the classroom teacher to communicate with others (e.g., university personnel) who can assist in data analysis and the identification of modifications. However, fax machines can be used to transmit data for frequent analysis, and problems that arise can be discussed over the telephone or, if the technology is available, through interactions via compressed video (i.e., two visual and auditory television transmission).

Although there are challenges, there also are advantages to conducting research in the rural setting that may not be in the urban setting. First, valid training sites that reflect family preferences (e.g., restaurants, pharmacies, banks, grocery stores) may be easier to identify since numbers may be limited in a small community. This may simplify the generalization plan. Second, students going to community sites may be recognized by community members, thus facilitating the opportunity for naturalistic instruction in social skills. Third, the rural teacher is more likely to

personally know community members, increasing the ease in such variables as gaining access to training sites and obtaining necessary permission from parents and administration. Fourth, classroom teachers, administrators, and district personnel often like the publicity generated by the publication of research in professional journals. Fifth, a researcher selecting target skills for research will more likely be able to identify target skills common across all students in the class. Finally, once a rural teacher develops research skills, that person has the skills to share expertise with other personnel in the region.

Based on our experiences, we encourage training programs to focus on the development of research skills when training rural teachers. The ability to be a data-based problem solver in the classroom may be one way of effectively countering the burn-out so often described in rural special education settings. In addition, the ability to share effective practices in rural settings through professional research and subsequent publication and presentation is a valuable way to contribute to the field of special education.

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